

The claims remaining in the application are 1, 3-5, 10-13, 15-17, and 22-24.

REMARKS

The Applicants would like to thank the Examiner for the quick and courteous Office Action and particularly for the indication of allowability of claim 23 therein if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

Claim Objection

The Examiner has objected to claims 9 and 21 under 37 CFR §1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The Examiner required the Applicant to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claims in independent form. The Examiner asserts that claims 9 and 21 fail to further limit the scope of parent claims 1 and 13, respectively.

The Applicant would respectfully direct the Examiner's attention to the amendments to the claims herein where claims 9 and 21 have been cancelled. It is respectfully submitted that these cancellations render the subject objection moot. Reconsideration is respectfully requested.

Previous Rejection Under 35 U.S.C. §102(b) Over Thomas

The Examiner has rejected claims 1, 3-5, 9, 10, 13, 15-17, 21, and 22 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Pat. No. 4,836,941 to Thomas.

The Examiner finds that Thomas teaches zinc halide and calcium halide brines having densities within the scope of the present invention, wherein amine salts and ammonium salts are used as corrosion inhibitors. The Examiner thus contends that the present invention is anticipated by Thomas.

The Applicant must respectfully traverse.

A patent claim is anticipated, and therefore invalid, only when a single prior art reference discloses each and every limitation of the claim. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047, 34 U.S.P.Q.2d 1565 (Fed. Cir.), cert. denied, 116 S.Ct. 516 (1995).

The Examiner's attention is respectfully directed to the amendments to the claims herein where all of the independent claims have been amended to recite that an additive is present or added "to raise the pH of the brine and increase the corrosion inhibition of the brine". It is respectfully submitted that the inclusion of this language in the independent claims does not constitute improper insertions of new matter because this or very similar language was present in all of these claims in the application as originally filed.

Thomas discloses a brine fluid and is primarily concerned with increasing the alkalinity of water. The use of the term "alkalinity" indicates that this document is concerned with water treatment technology rather than corrosion inhibition technology (where the term pH would be used) – although certainly the latter is mentioned. The teaching of Thomas is to increase alkalinity by increasing the chloride (or other halide) content of the brine using CaCl_2 when the zinc is in solution as ZnCl_2 . A goal of Thomas is to have a halide atom occupy all of the co-ordination spheres on the zinc atom to suppress its hydrolysis. For instance, when CaCl_2 and ZnCl_2 are used, the predominant species is ZnCl_4^{2-} . See also the discussion in Thomas from column 2, line 44 to column 3, line 51.

To reduce corrosion, the compositions of Thomas incorporate conventional corrosion inhibitors. Examples of such inhibitors are listed in the footnote to Table V in column 7 of D1 and include *inter alia* amine salts. It is respectfully submitted that the amine salts used in Thomas are not capable of generating ammonia or amines (as required by the present claims) because they are in mixtures that are already salted, *e.g.* KI-86 (solution of amine salts) and Corban 333 Corrosion Inhibitor A205 (organic nitrogen compound and ammonium salt) and thus have no possibility of taking up or absorbing acid.

Additionally, it is respectfully submitted that there is no suggestion in Thomas that the amine salts, and amounts thereof, are effective to raise the pH of the brine fluid, which is a requirement of amended claim 1.

As established above, the Thomas disclosure is directed to increasing the alkalinity of water and indicates that conventional corrosion inhibitors may be employed (please

see column 4, lines 22-37). It is respectfully submitted that there is no suggestion or hint in Thomas that corrosion inhibition may be enhanced by the subject matter of claim 1, namely incorporating in the brine an additive as defined in that claim in an amount so as to raise the pH of the brine *and* increase corrosion inhibition.

Thomas is primarily concerned with alkalinity, not pH. Alkalinity is a term used to discuss the calcium (or zinc) concentration of a fluid. Thomas understands that these are different terms, please see column 3, lines 29-51. Thomas states that "pH alone does not indicate a fluid's corrosiveness" (lines 45-46). However, it is pH with which the present claims are concerned, not alkalinity. Thomas further notes in lines 36-40 of column 3 that:

... varying the alkalinity will shift the undiluted pH but not the diluted pH. For example, the pH of a lime-water slurry is *constant and does not vary* with the amount of lime present. (Emphasis added.)

Thus, Thomas may actually be seen as *teaching away from* pH changes, thus providing a teaching opposed to the claimed invention. The Examiner's attention is further respectfully directed to *In re Haruna, et al.*, 249 F.3d 1327, 1335; 58 U.S.P.Q. 2d 1517 (Fed. Cir. 2001):

"A prima facie case of obviousness can be rebutted if the applicant ... can show 'that the art in any material respect taught away' from the claimed invention." *In re Geisler*, 116 F.3d 1465, 1469, 43 U.S.P.Q.2D (BNA) 1362, 1365 (Fed. Cir. 1997) (quoting *In re Malagari*, 499 F.2d 1297, 1303, 182 U.S.P.Q. (BNA) 549, 533 (CCPA 1974)). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, ... would be led in a direction divergent from the path that was taken by the applicant." *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360, 52 U.S.P.Q.2D (BNA) 1294, 1298 (Fed. Cir. 1999).

It should also be noted that most of the nitrogen-containing compounds of Thomas are not functioning particularly well as corrosion inhibitors. A 95% inhibition is generally considered a very minimum threshold to be even considered an effective corrosion inhibitor, and in the field, the percent inhibition should be 90% or better to be considered for use. With this understanding, only Baracor[®] 300 corrosion inhibitor effectively inhibits corrosion (Solution numbers 2E, 3E and 4E of Table V), and even so, not that acceptably.

It is thus respectfully submitted that an anticipation rejection of the claims has been avoided due to the amendments to the claims. Each and every limitation of the claims is not taught by Thomas. Reconsideration is respectfully requested.

Previous Rejection Under 35 U.S.C. §102(e) Over Mishra

The Examiner in the parent application has rejected claims 1, 3, 6, 9-13, 15, 18, 21, 22 and 24 under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Pat. No. 5,891,225 to Mishra, et al.

The Examiner finds that Mishra, et al. teaches a brine which comprises a halide salt, such as calcium chloride at levels up to 42 weight percent, wherein a hydroxyl carboxylate and polyalkoxylated amine are used as corrosion inhibitors. The Examiner contends that a brine level of 42% by weight would clearly be greater than the 11 lbs/gal taught in the claims.

Again, the Applicant must respectfully traverse.

A patent claim is anticipated, and therefore invalid, only when a single prior art reference discloses each and every limitation of the claim. *Glaxo Inc. v. Novopharm Ltd.*, *id.*

The Examiner's attention is respectfully directed to the amendments to all of the independent claims herein where the additive is now specified as being selected from the group consisting of ammonia, hydroxylamine, hydrazine, azoles, piperidines, piperazines, aziridines, azides, betaines, amino acids, ureas, guanidines, tetramethylenhexamine, salts thereof, and mixtures thereof. It is respectfully submitted that these additions do not constitute improper insertions of new matter since these additives were recited in dependent claims 7, 8, 19, and 20 as originally filed. (These claims are cancelled herein as redundant.)

As the Examiner notes, Mishra, et al. is concerned with a method for applying halide brine to surfaces that involves forming an admixture of polyhydroxy carboxylate and polyalkoxylated amine dispersed in a halide brine solution; please see the Abstract. Amines other than polyalkoxylated amines are not taught or suggested; see, for instance, column 2, lines 10-43. With the amendments to the claims herein, Mishra, et al. does not teach or suggest each and every limitation of the claims, it is respectfully submitted.

Polyalkoxylated amines are not encompassed by the amended claims. It is further respectfully submitted that an anticipation rejection of the claims based on Mishra, et al. has been avoided due to the amendments to the claims. Reconsideration is respectfully requested.

Previous Rejection Under 35 U.S.C. §102(e) Over Beazley, et al.

The Examiner has rejected claims 1-3, 6, 8, 9, 12, 13, 15, 18, 20, and 21 under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Pat. No. 5,935,487 to Beazley, et al.

The Examiner finds that Beazley, et al. teaches a brine which comprises calcium chloride, and a corrosion inhibitor of a diethanolamide product. Beazley, et al. is seen by the Examiner to exemplify calcium chloride brines comprising 35 weight percent of the salt, which would clearly have greater than 11 lbs/gal density.

Once more, the Applicant must respectfully traverse.

A patent claim is anticipated, and therefore invalid, only when a single prior art reference discloses each and every limitation of the claim. *Glaxo Inc. v. Novopharm Ltd.*, *id.*

The Examiner's attention is respectfully directed to the amendments to all of the independent claims herein where the additive is now specified as being selected from the group consisting of ammonia, hydroxylamine, hydrazine, azoles, piperidines, piperazines, aziridines, azides, betaines, amino acids, ureas, guanidines, tetramethylenhexamine, salts thereof, and mixtures thereof. It is respectfully submitted that these additions do not constitute improper insertions of new matter since these additives were recited in dependent claims 7, 8, 19, and 20 as originally filed.

As the Examiner notes, Beazley, et al. is concerned with the addition of an effective amount of a liquid modified diethanolamide to a calcium chloride composition, which can be a brine solution or a solid, to reduce the amount of corrosion of metals by the resulting composition; please see the Abstract. Amines other than diethanolamide are not taught or suggested; see, for instance, column 2, lines 15-24. With the amendments to the claims herein, Beazley, et al. does not teach or suggest each and every limitation of the claims, it is respectfully submitted. Liquid modified diethanolamides are not encom-

passed by the amended claims. It is additionally respectfully submitted that an anticipation rejection of the claims based on Beazley, et al. has been avoided due to the amendments to the claims. Reconsideration is respectfully requested.

Previous Rejection Under 35 U.S.C. §103(a) Over Atkinson

The Examiner has rejected claims 1, 3, 6-8, 10, 12, 13, 15, 18-20, 21, and 22 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Pat. No. 5,846,450 to Atkinson for reasons of obviousness.

The Examiner finds that Atkinson teaches a brine which comprises formates, such as potassium formate, and which can further comprise water, ammonia and other corrosion inhibitors. The levels of as high as 70% potassium formate would result in brines within the density level of greater than 11 lbs/gal. Atkinson is seen by the Examiner to teach that combinations of water and ammonia may be used as the solvent. The Examiner admits that Atkinson differs in that a combination of water and ammonia as the solvent is not disclosed in an example. However, the Examiner contends that it would be obvious to vary the amount of ammonia and water as a combination solvent, including within the concentration ranges of the present invention, in the invention of Atkinson, given the teaching of Atkinson that such combinations may be used as solvents, and may be used to provide specific refrigerant vapor.

The Applicant must respectfully traverse.

Atkinson is concerned with an absorbent for use in absorption refrigeration systems, air conditioning systems, heat pumps or dehumidifiers that is primarily a solution of potassium formate. The absorbent is generally water-based but may also be ammonia or methanol (Abstract; claims, and elsewhere). Ammonia is not taught as a corrosion inhibitor. Corrosion inhibition is instead supplied by different compounds as taught at column 3, lines 48-52:

The absorption agent may further comprise a corrosion inhibitor.
The corrosion inhibitor may be a monohydric alcohol, a polyhydric alcohol, a triazole compound, an alkali metal molybdate, or a mixture of two or more thereof.

None of these corrosion inhibitors is shown to decompose to an amine, ammonia, or an amine salt — the additive recited in the claims.

Ammonia is used in Atkinson as a polar solvent replacement for water (alternatively methanol may be used), where potassium formate is the primary component. In the claimed invention, the ammonia or amine absorbs or neutralizes the acid present, as evidenced by the fact that the pH of the brine is raised. The Examiner's attention is again respectfully directed to the amendments to the claims herein, where this recitation as been reincorporated to all of the independent claims. If ammonia were simply used as a solvent, as the Examiner finds Atkinson teaches, the pH would not change.

For further information and explanation (and without limiting the claims), the Examiner's attention is respectfully directed to page 2, lines 18-21 of the application as filed, "The addition of an amine or ammonia (or compound capable of generating amine or ammonia) to a high density brine of sufficient salt content, *e.g.* zinc bromide, in a controlled manner *has been discovered to reduce the acidity of the zinc solution.*" (Emphasis added.) Please also see page 3, lines 4-11, particularly 9-11: "While not wishing to be limited to a particular mechanism or explanation of how the invention operates, *the amine may be understood as one which is capable of absorbing some of the acid.*" (Emphasis added.) Additionally, please see page 4, lines 10-16, in particularly 10-12: "As noted, compounds capable of releasing or generating a neutralizing compound, such as ammonia, an amine, or a salt thereof, are suitable additives as well." Finally, the Examiner's attention is respectfully directed to page 6, lines 8-12:

The lower acidity achieved by the invention may result from simple acid-base neutralization, or may possibly arise from ammonia forming complexes with zinc suppressing the hydrolysis of the complexed water molecules. However, it will be understood that the invention is not limited to any particular explanation of the mechanism by which it might work.

It is respectfully submitted that Atkinson does not suggest, teach or propose the raise in pH and its consequence of corrosion inhibition as recited in the amended composition and method claims.

Another important difference between the Atkinson teachings and the claimed invention is the claimed invention understands that the brine is an acidic environment initially (hence the recitation that the pH is raised). Applicant respectfully submits that

Atkinson does not teach, hint or suggest this about his potassium formate absorbent solutions. Indeed, the Applicant respectfully submits that the pH of Atkinson's formate solutions will be above 7. This is due to the salt of weak acids dissolved in water, making both some formic acid and hydroxide.

It is thus respectfully submitted that for all of these reasons a *prima facie* 35 U.S.C. §103 rejection has not been made. Reconsideration of the claims is respectfully requested.

Previous Rejection Under 35 U.S.C. §103(a) Over JP Abstract

The Examiner has rejected claims 1, 3, 6, 9, 10, 12, 13, 15, 18, 21, and 22 under 35 U.S.C. §103(a) as allegedly being unpatentable over the Derwent Abstract to JP 63-199278 A for reasons of obviousness.

The Examiner finds that the JP 63-199278 A teaches a heavy brine of calcium chloride which comprises ethylene diamine and/or diethylene triamine as corrosion inhibitors. JP 63-199278 is seen to exemplify the use of such corrosion inhibitors in brines of 29.9% calcium chloride, which are approximately 10.8 lbs/gal brines. The Examiner admits that JP 63-199278 differs from the present invention in that brines as high as 11 lbs/gal density are not disclosed. However, the Examiner contends that it would be obvious to one of ordinary skill in the art to utilize the corrosion inhibitors of JP 63-199278 in brines of 11 lbs/gal density, since such brines would be expected to have similar corrosion properties with brines of extremely close density, such as of 10.8 lbs/gal.

The Applicant must again respectfully traverse.

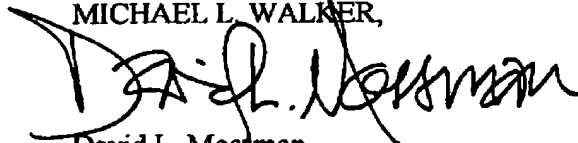
As the Examiner notes, JP 63-199278 teaches ethylene diamine and/or diethylene triamine as corrosion inhibitors. These are the only amines mentioned. The Examiner's attention is respectfully directed to the more specific recitation of additives now present in all of the independent claims. It is respectfully noted that this recitation does not include ethylene diamine and/or diethylene triamine. Further, it is respectfully noted that JP 63-199278 does not teach or suggest any of the other additives now recited in the independent claims. Applicant thus respectfully submits that a *prima facie* 35 U.S.C. §103 rejection has not been made.

To support an obviousness rejection, the Examiner has the initial burden of establishing a *prima facie* case of obviousness of the pending claims over the cited prior art, *In re Oetiker*, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 1266; 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992). Applicant respectfully submits that the Examiner has not shown where it is suggested in the art that it is desirable to modify JP 63-199278 to give the invention as recited in the amended claims.

Reconsideration is respectfully requested.

It is respectfully submitted that the amendments and arguments presented above overcome all of the rejections. Reconsideration and allowance of the claims are respectfully requested. The Examiner is respectfully reminded of his duty to indicate allowable subject matter. The Examiner is invited to call the Applicants' attorney at the number below for any reason, especially any reason that may help advance the prosecution.

Respectfully submitted,
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